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| EXAMINER | |
|---|---|
| VORTMAN, ANATOLY | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2835 | |

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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/774,314 | NOVOTNY, SHLOMO | |
| | Examiner | Art Unit | |
| | Anatoly Vortman | 2835 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *26 May 2006 (RCE)*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/26/06 has been entered.

### *Claim Objections*

2. Claim 26 is objected to because of the following informalities: claim recites the limitation "the fan" in line 8 of the claim, which lacks antecedent basis. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 7, 8, and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 7 recites that "the phase change material is enclosed in a heat conductive container", and claim 22 recites the step of "enclosing the phase change material in a container". These limitations contradict with subject matter of parent independent claims 1 and 15. Claim 1 recites that "a plurality of phase change material layers disposed upon the interior surface (of the enclosure)", and claim 15 recites the step of "cooling the airflow using a plurality of layers of phase change material [...] positioned on an interior surface of the enclosure". The specification is not enabling the embodiment in which the phase change material is enclosed in a container (as shown on Fig. 3) and at the same time utilizes a plurality of phase change material layers disposed upon the interior surface of the enclosure.

## *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 9-13, 15-17, 19, 21, and 23, are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (PGPUB US 2003/0147216) (Patel '16), in view of O'Grady (US/ 6,170,561) and further in view of Fitch et al., (US/6,317,321) (Fitch).

With respect to claim 1, Patel '16 disclosed an electronic component system comprising: an enclosure (10), one or more electronic components positioned within the enclosure (22, 24), at least one fan (12a, 12b) positioned within the enclosure for generating an airflow across the one or more electronic components (paragraph 0031), a heat exchanger for cooling the airflow (18a, 18b, paragraph 0026).

While Patel '16 recognizes the importance of adequately and reliably cooling the enclosed electronic components (paragraph 0006-0010, also note dual heat exchangers - 18a & b, and dual fans - 12a & b provided for redundancy), and the susceptibility of computer cooling system to failure of cooling support systems of the data center housing the computer (paragraph 0010), he did not disclose a plurality of phase change material layers exposed to the airflow within the enclosure generated by the fan for absorbing heat from the airflow upon a failure associated with the heat exchanger.

O'Grady disclosed a back up cooling device for electronic components comprising a phase change material for absorbing heat from the airflow upon a cooling system failure (failure of cooling support systems of the data center housing such computers as mentioned in column 1, lines 20-25) associated with electronic component systems.

Fitch further disclosed an electronic device enclosure (Fig. 8) comprising a heat-absorbing phase change material layer (39) disposed upon interior surface of the enclosure (35), wherein a plurality of layers of the phase change material may be employed (column 4, line 45).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to create a system for permitting orderly shutdown of electronic components by incorporating the phase change material taught by O'Grady in the electronic component system disclosed by Patel '16, so as to provide repair time by delaying electronic component failure after cooling system failure (O'Grady, column 2, lines 25-30). It would have been also obvious to use multiple layers of the phase change material in the system of Patel as modified by O'Grady, as taught by Fitch, in order to further augment the heat transfer rate.

With respect to claim 2, O'Grady further discloses that the phase change material has a phase change temperature that is above a temperature of the airflow when there is no failure associated with the heat exchanger, and below a maximum operating temperature of the one or more electronic components (O'Grady, column 4, lines 50-60).

With respect to claim 3, Patel '16 further discloses that the heat exchanger is a fluid to air heat exchanger (Patel '16, Paragraph 0026).

With respect to claim 4, Patel '16 further discloses that the fluid to air heat exchanger is coupled to a fluidic circuit (Patel '16, Paragraph 0028).

With respect to claim 5, Patel '16 further discloses that the fluidic circuit circulates one of a refrigerant and water (Patel '16, Paragraph 0028).

With respect to claim 9, Fitch disclosed that a phase change material may be in microencapsulated form that is embedded in a coating applied to one or more surfaces within an electronic system enclosure (Fitch, abstract, figure 8, column 5, lines 4-7).

With respect to claim 10, Fitch disclosed that a phase change material is encapsulated by a sealing coat (Fitch, column 5, lines 1-2)

With respect to claim 11, Patel further discloses a temperature sensor for sensing temperature within the enclosure and a high temperature indication indicative of a high temperature within the enclosure (Patel, Paragraphs 0033-0035), the high temperature being lower than a phase change temperature of the phase change material (O'Grady, lines 50-55).

With respect to claim 12, O'Grady further discloses that the phase change material is an organic acid (O'Grady, column 6, line 20).

With respect to claim 13, Patel '16 further discloses at least one fan (12a, 12b) that recirculates air within the enclosure (Patel et al., paragraph 0025).

With respect to claim 15, Patel '16 disclosed a method of cooling one or more electronic components positioned in an enclosure, comprising: providing an air cooling element (18a, 18b, paragraph 0026) within the enclosure (10), generating an airflow (paragraph 0031) across the cooling element and one or more electronic components (22, 24) positioned within the enclosure.

While Patel '16 recognizes the importance of adequately and reliably cooling the enclosed electronic components (paragraph 0006-0010, also note dual heat exchangers - 18a & b, and dual fans - 12a & b provided for redundancy), and the susceptibility of computer cooling system failure to failure of cooling support systems of the data center housing the computer (paragraph 0010), he did not disclose cooling the airflow using a plurality of layers of the phase change material upon a failure in the cooling element, where the phase change material is positioned within the enclosure and exposed to airflow within the enclosure generated by the fan.

O'Grady disclosed a phase change material to be used as an additional cooling mechanism for electronic component systems by absorbing heat from the airflow (upon failure of

cooling support systems of the data center housing such computers as mentioned in column 1, lines 20-25).

Fitch further disclosed an electronic device enclosure (Fig. 8) comprising a heat-absorbing phase change material layer (39) disposed upon interior surface of the enclosure (35), wherein a plurality of layers of the phase change material may be employed (column 4, line 45).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to create a system for permitting orderly shutdown of electronic components by incorporating the phase change material taught by O'Grady in the electronic component system disclosed by to Patel '16, so as to provide repair time by delaying electronic component failure after cooling system failure (O'Grady, column 2, lines 25-30). It would have been also obvious to use multiple layers of the phase change material in the system of Patel as modified by O'Grady, as taught by Fitch, in order to further augment the heat transfer rate.

With respect to claim 16, Patel '16 further discloses that the air- cooling element includes moving fluid through a fluidic circuit (Patel, paragraph 0028). The fluidic circuit includes a fluid to air heat exchanger (Patel, paragraph 0026).

With respect to claim 17, Patel '16 further discloses that the fluidic circuit is pumped with water and a refrigerant (Patel '16, paragraph 0028).

With respect to claim 19, Patel '16 further discloses capability of indication indicative of a high temperature condition within the enclosure.

With respect to claim 21, O'Grady further discloses that the phase change material has a melting point that is above a temperature of the airflow when there is no failure in the air cooling

element, and below a maximum operating temperature of the one or more components (O'Grady, Column 4, line 51-60).

With respect to claim 23, O'Grady further discloses that the phase change material is encapsulated in a surface positioned within the airflow (O'Grady, column 2, lines 10-20, column 5, lines 25-30).

6. Claim 26-29, 31-33, and 35, are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (PGPUB US 2003/0147216) (Patel '16), in view of O'Grady (US Patent 6,170,561) and further in view of US/4,259,401 to Chahroudi et al., (Chahroudi).

With respect to claim 26, Patel '16 disclosed a cooling system comprising of an enclosure (10), one or more electronic components positioned in the enclosure (22, 24), means for generating an airflow (12a, 12b) across the one or more electronic components, cooling means for cooling the airflow (18a, 18b, paragraph 0026). While Patel '16 recognizes the importance of adequately and reliably cooling the enclosed electronic components (paragraph 0006-0010, also note dual heat exchangers - 18a & b, and dual fans - 12a & b provided for redundancy), and the susceptibility of computer cooling system to failure of cooling support systems of the data center housing the computer (paragraph 0010), he does not explicitly disclose a phase change material positioned within the enclosure in the airflow generated by the fan and that said phase change material at least partially comprising a hydrated salt.

O'Grady discloses a phase change material for absorbing heat from the airflow upon a failure in the cooling means (failure of cooling support systems of the data center housing such computers as mentioned in column 1, lines 20-25), positioned in the airflow.

Chahroudi teaches conventionality of using hydrated salts as phase change materials (column 6, lines 8+).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to incorporate the hydrated salt phase change material taught by O'Grady and Chahroudi in the electronic component system taught by Patel '16, so as to provide repair time by delaying electronic component failure after cooling system failure (O'Grady, column 2, lines 25-30).

With respect to claim 27, Patel '16 further discloses that the means for generating the airflow includes a fan (12a, 12b).

With respect to claim 28, Patel '16 further discloses that the cooling means includes a fluid to air heat exchanger (Patel '16, Paragraph 0026).

With respect to claim 29, Patel '16 further discloses that the fluid to air heat exchanger is coupled to a fluidic circuit that circulates one of a refrigerant and water (Patel '16, paragraph 0028).

With respect to claim 31, O'Grady further discloses that the phase change material is enclosed in a container (O'Grady, "11").

With respect to claim 32, O'Grady further discloses that the container includes fins (O'Grady, Fig 6, "30").

With respect to claim 33, O'Grady further discloses that the phase change material is encapsulated in a surface positioned within the airflow (O'Grady, column 2, lines 10-20, column 5, lines 25-30).

With respect to claim 35, O'Grady further discloses that the phase change material is a material chosen from the group of materials consisting of a paraffin, a hydrated salt, a metal, an alloy, and an organic acid (O'Grady, column 6, line 20).

7. Claims 6 and 18, are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel '16 in view of O'Grady and Fitch as applied above to claims 1 and 15, respectively, and further in view of Meir (PGPUB 2002/0191430).

Regarding claim 6, the system as disclosed by Patel '16 as modified by O'Grady and Fitch, satisfies all the limitations of claim 1.

While Patel '16 disclosed that the heat exchanger could be any type of heat exchange device (paragraph 0026), he did not explicitly disclose the heat exchanger to be a thermoelectric device.

Meir teaches a thermoelectric device heat exchanger.

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the thermoelectric device heat exchanger taught by Meir in the electronic component system disclosed by Patel '16 as modified by O'Grady and Fitch , to improve the efficiency of the cooling system (Meir, Paragraph 0018).

Regarding claim 18, the system as disclosed by Patel '16, as modified by O'Grady and Fitch satisfies all the limitations of claim 15.

While Patel '16 disclosed that the heat exchanger could be any type of heat exchange device (paragraph 0026), he did not explicitly disclose that the air-cooling element is a thermoelectric device.

Meir teaches an air-cooling element which is a thermoelectric device.

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the thermoelectric device air cooler taught by Meir in the electronic component system disclosed by Patel '16 as modified by O'Grady and Fitch to improve the efficiency of the cooling system (Meir, Paragraph 0018).

8. Claims 14 and 25, are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (PGPUB US 2003/0147216) (Patel '16) in view of O'Grady and Fitch as applied above, and further in view of Patel et al. (PGPUB U52004/0264124) (Patel '24).

With respect to claim 14, the system as disclosed by Patel '16, as modified by O'Grady and Fitch satisfies all the limitations of claim 1.

While Patel '16 disclosed that the electronic components could be broadly construed to mean any type of system board (paragraph 0027), he did not explicitly disclose that one of the electronic components is a blade server.

Patel '24 discloses a cooling arrangement for an electronic component system comprising blade servers (Patel '24, "701-712" figure 7, paragraph 0077).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the blade servers taught by Patel '24 in the system as disclosed by Patel '16 as modified by O'Grady and Fitch , to efficiently cool the blade servers.

With respect to claim 25, the system as disclosed by Patel '16 as modified by O'Grady and Fitch, satisfies all the limitations of claim 15, but did not explicitly disclose that one of the electronic components is a blade server.

Patel '24 discloses a cooling arrangement for an electronic component system comprising blade servers (Patel '24, "701-712" figure 7, paragraph 0077).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the blade servers taught by Patel '24 in the system as disclosed by Patel '16 modified by O'Grady and Fitch , to efficiently cool the blade servers.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel '16 in view of O'Grady and Fitch as applied above to claim 15, and further in view of Schwabl (US/5,714,938).

The system as disclosed by Patel '16 as modified by O'Grady and Fitch satisfies all the limitations of claim 15.

While Patel '16 discloses means to monitor and control the temperature of the different electronic components (paragraph 0014, 0015, temperature sensor '46' and control chip '48'), he did not explicitly disclose means of shutting down one or more electronic components upon failure in the fluidic circuit.

Schwabl teaches a means of shutting down one or more electronic components upon failure in the fluidic circuit in an electronic component system (Schwabl, abstract, figure 1, "11").

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the electronic component shut down device taught by Schwabl, in the electronic component system disclosed by Patel '16 as modified by O'Grady and Fitch, to prevent overheating damage to the electronic components (Schwabl, column 1, line 55).

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel '16 in view O'Grady and Fitch as applied above to claim 15, and further in view of Patel et al. (US Patent 6,1 15,251) (Patel '51).

The system as disclosed by Patel '16 as modified by O'Grady and Fitch satisfies all the limitations of claim 15, but did not explicitly disclose applying the phase change material to a surface positioned within the airflow and applying a sealing coat on top of the phase change material.

Patel '51 disclosed an electronic component system with the phase change material (Patel '51, abstract) applied to a surface positioned within the airflow with a sealing coat on top of the phase change material.

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the phase change material and sealing coat as taught by Patel '51 in the electronic component system disclosed by Patel '16 as modified by O'Grady and Fitch, to reduce the overall size of the electronic component system (Patel '51, column 2, lines 15-25).

11. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel '16 in view of O'Grady and Chahroudi, as applied above to claim 26, and further in view of Meir (PGPUB 2002/0191430).

Regarding claim 30, the system as disclosed by Patel '16 as modified by O'Grady and Chahroudi satisfies all the limitations of claim 26.

While Patel '16 disclosed that the heat exchanger could be any type of heat exchange device (paragraph 0026), he did not explicitly disclose the cooling means to be a thermoelectric device.

Meir teaches a thermoelectric device cooling means.

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the thermoelectric device cooling means taught by Meir in the electronic component system disclosed by Patel '16 as modified by O'Grady and Chahroudi, to improve the efficiency of the cooling system (Meir, Paragraph 0018).

12. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel '16 in view of O'Grady and Chahroudi, as applied above to claim 26, and further in view of Fitch et al., (US Patent 6,317,321 B1) (Fitch).

With respect to claim 34, the system as disclosed by Patel '16 as modified by O'Grady and Chahroudi satisfies all the limitations of claim 26.

While O'Grady et al, discloses that the phase change material can be incorporated in different configurations (as shown in figures 3, 4, and 7), Patel '16 as modified by O'Grady and Chahroudi did not disclose that one or more interior surfaces of the enclosure is coated with the phase change material.

Fitch disclosed a phase change material coated on the interior surfaces of an electronics enclosure, where the phase change material is encapsulated by a sealing coat (Fitch, abstract, figure 8, column 5, lines 1-2 and 4-7).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the micro-encapsulated phase change material coated on multiple surfaces of the enclosure as taught by Fitch in the system as taught by Patel '16 as modified by O'Grady and Chahroudi, to utilize the additional cooling capabilities of the micro-encapsulated surface coating without a significant increase in weight, size and cost (Fitch, column 3, lines 10-15).

13. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel '16 in view of O'Grady and Chahroudi, as applied above to claim 26, and further in view of Patel et al. (PGPUB U52004/0264124) (Patel '24).

With respect to claim 36, the system as disclosed by Patel '16 as modified by O'Grady and Chahroudi satisfies all the limitations of claim 26.

Patel '16 does not explicitly disclose that one of the electronic components is a blade server.

Patel '24 discloses a cooling arrangement for an electronic component system comprising blade servers (Patel '24, "701-712" figure 7, paragraph 0077).

It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made, to incorporate the blade servers taught by Patel '24 in the system as disclosed by Patel '16 as modified by O'Grady and Chahroudi, to efficiently cool the blade servers.

***Response to Arguments***

14. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anatoly Vortman whose telephone number is 571-272-2047. The examiner can normally be reached on Monday-Friday, between 10:00 am and 6:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Lynn Feild can be reached on 571-272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anatoly Vortman
Primary Examiner
Art Unit 2835

AV